



**North Slope of Alaska ARM Facilities
Monthly Status Update
Sandia National Labs**

May 2017

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1 North Slope Facilities Management Executive Summary and Major Issues

This monthly report is intended to communicate the status of North Slope ARM facilities managed by Sandia National Labs.

Operations Team

- * Mark Ivey- ARM Alaska Sites Manager (SNL)
- * Fred Helsel- AMF3 Site Manager (SNL)
- * Dan Lucero- Barrow Site Manager (SNL)
- * Darielle Dexheimer- Tethered Balloon Operations (SNL)
- * Valerie Sparks- ARM Project Office (SNL)
- * Martin Stuefer- Rapid Response Team (UAF)
- * Randy Peppler- ARM DQ Office Manager (OU)

2 Budget

FY2017 Financials (as of May 26, 2017)

	November	YTD
Carryover funds	\$3,729,525	
Funds Allocated YTD	\$4,524,000	
Carryover plus YTD funds	\$8,253,525	
Cost, burdened amount	\$4,492,812	
Uncosted Funds	\$3,760,713	
Commits, burdened total	\$1,996,642	
Current fiscal year uncommitted funds	\$1,764,071	
Subsequent fiscal year (SFY)commits	\$623,189	
Total uncommitted funds, including SFY commits	\$1,140,882	
Fully Burdened Staff Costs	\$326,000	
Fully Burdened Contract Costs	\$323,000	
Fully Burdened Total Costs	\$649,000	\$4,493,000

3 Safety

AMF3- No incident/Injury

Barrow - No Incident/Injury

4 Instrument Status – Provided by Martin Stuefer

AMF3

INFORMAL AMF3 INSTRUMENT STATUS REPORT FOR May 19, 2017 - May 26, 2017

BRIEF STATUS OF INSTRUMENTS and site IN OLIK TOK AS OF 2017/05/26:

Facilities	Operational
Data Systems	Operational
Vehicles	Operational
Desktop Computers	Operational
SKYRAD - SKY Radiometer on Stand for downwelling	Operational
MFRSR - Multifilter Rotating Shadowband Radiometer	Operational
GNDRAD - Ground Radiometer on Stand for Upwelling	Operational
MFR3m - Multifilter Radiometer at 3m height	Operational
MAWS - Automatic Weather Station	Not Operational
MET - Meteorological Instruments on Tower	Operational
CMH - Chilled Mirror Hygrometer	Operational
AMC - Soil, up/downwelling radiation measurements	Operational
ECOR - Eddy Correlation Flux System	Operational
MWR3C - Three Channel Microwave Radiometer	Operational
MPL - Micropulse Lidar	Not Operational
DL - Doppler Lidar	Operational
RL - Raman Lidar	Not Operational
CEIL - Vaisala Ceilometer	Operational
RWP - Radar Wind Profiler	Operational as per http://radar.arm.gov
KAZR - Ka ARM Zenith Radar	Operational as per http://radar.arm.gov
KaSACR - Ka-Band Scanning ARM Cloud Radar	Operational as per http://radar.arm.gov
WSACR - W-Band Scanning ARM Cloud Radar	Operational as per http://radar.arm.gov

TSI - Total Sky Imager	Operational
AOS - Aerosol Observing System	Partly Operational
AOSMET - AOS Meteorological Measurements	Operational
CPC - Condensation Particle Counter	Operational
CAPS - Cavity Attenuated Phase Shift Extinction Monitor	Not Operational
ACSM - Aerosol Chemical Speciation Monitor	Not Operational
HTDMA - Humidified Tandem Differential Mobility Analyzer	Partly Operational
GHG - PICARRO	Operational
NEPH - Nephelometer	Operational
PSAP - Particle Soot Absorption Photometer	Operational
UHSAS - Ultra-High Sensitivity Aerosol Spectrometer	Operational
IMPACTOR - AOS Impactor	Operational
OZONE - AOS Ozone	Operational
TRACEGAS - AOS CO, N2O, H2O	Operational
AERI - Atmospheric Emitted Radiance Interferometer	Operational
BBSS - Balloon Borne Sounding System	Operational
CIMEL - Cimel Sunphotometer	Operational
MASC - Multi Angle Snowflake Camera	Operational
PIP - Precipitation Imaging Package	Operational
LPM - Laser Precipitation Monitor	Operational
GEONOR - Geonor Weighing Gauge	Operational
SR50A - Snow Depth Sensor	Operational
MET-AIR - DataHawk Unmanned Aerial System	Operational
TBS - Tethered Balloon System	Operational
CCN - Cloud Condensation Nuclei Particle Counter	Operational

* Oliktok Instruments in Detail: *

INFRASTRUCTURE --- Facilities --- Operational.

INFRASTRUCTURE --- Data Systems --- Operational.

2017/05/25, CM-2017-AMF3-VSN-1985: HDD S/N NA76M3Z5 was full, so it was replaced with HDD S/N NA76M5N3. HDD s/n NA76M3Z5 will be shipped via USPS tracking # 9114 9014 9645 0952 9750 44.

2017/05/23, CM-2017-AMF3-VSN-1983: HDD S/N NA76MDY1 was full, so it was replaced with HDD S/N NA76M3Z5. HDD S/N NA76MDY1 will be shipped via USPS tracking # 9114 9014 9645 0952 9750 37.

2017/05/21, CM-2017-AMF3-VSN-1981: HDD S/N NA7Q2CH3 was full, so it was replaced with HDD S/N NA76MDY1. HDD S/N NA7Q2CH3 will be shipped via USPS tracking # 9114 9014 9645 0952 9750 37.

2017/05/19, CM-2017-AMF3-VSN-1979: HDD S/N NA78Y5TM was full, so it was replaced with HDD S/N NA7Q2CH3. HDD S/N NA78Y5TM will be shipped via USPS tracking # 9114 9014 9645 0952 9750 37.

INFRASTRUCTURE --- Vehicles --- Operational.

INFRASTRUCTURE --- Desktop Computers --- Operational.

SKYRAD --- SKYRAD general --- Operational.

SKYRAD --- IRT --- Operational.

SKYRAD --- PIR 1 shaded --- Operational.

SKYRAD --- PIR 2 shaded --- Operational.

SKYRAD --- SOLAR Tracker --- Operational.

SKYRAD --- B&W diffuse --- Operational.

SKYRAD --- NIP --- Operational.

SKYRAD --- PSPg --- Operational.

SKYRAD --- MFRSR --- Operational, but Ingest is Halted.

2017/05/18, DQPR-6185: Site ops powered down instrument and inspected all connectors. There are no signs of corrosion. However, Wessley did find a broken pin on the MFR LINEAR HEATER card. It is the COMM harness coming from the logger (top right connector, bottom pin closest to card). The pin is currently broken off in the connector of the wire harness. Now we have a headID change, from 179888233 to 359776466 (double), so ingest is halted. The most recent DQPR status is "open - requires action."

2017/05/05, DQPR-6185: Head temperature 2 is consistently flagging since 4/18/2017. The logger voltage is also spiking at times.

TIPTWR --- GNDRAD general --- Operational.

TIPTWR --- MFR3m --- Operational.

TIPTWR --- PIRgnd --- Operational.

TIPTWR --- IRTgnd --- Operational.

TIPTWR --- PSPgnd --- Operational.

MAWS --- Automatic Weather Station --- Not Operational.

2017/05/26, DQPR-6245: Wind sensor data dropouts began intermittently on 05/24/2017 at 08:00 GMT. Full wind data loss began at 05/25/2017 on 01:00GMT. Site ops is troubleshooting. Donna Holdridge will send them a replacement data/power cable for the WMT703 on Tuesday (05/30/2017) after the holiday weekend. The most recent DQPR status is "open - requires action."

MET --- METTOWER general --- Operational.

2017/05/19, CM-2017-AMF3-VSN-1980: The MET tower lost communication with the server. After troubleshooting, site technicians switched fiber optic cable pairs, and communications resumed. The suspected cause is either that the fiber optic connections need to be cleaned and/or replaced, or there is a failing port on Juniper switch v2sw0.

MET --- CMH --- Operational.

MET --- Barometer --- Operational.

MET --- TEMPERATURE / HUMIDITY --- Operational.

MET --- WIND INSTRUMENTS (SONIC) --- Operational.

MET --- PWD --- Operational.

MET --- AMC --- Operational.

2017/05/13, DQPR-6208: Data after 20150822 for this site does follow the current DOD. The mentor will submit reformatted raw data for the period of 2014/09/14 to 2015/08/31 for the a1 level and b1 ingest so that the entire data record is based on the same DOD. Ken Reichl was assigned DQR D170519.1. The most recent DQPR status is "in progress - assignments."

ECOR --- ECOR --- Operational.

ECOR --- SEBS --- Operational.

MW RADIOMETERS --- MWR3C --- Operational.

LIDAR --- MPL --- Not Operational.

2017/04/10, DQPR-6142: The Dqplots indicate that polarization is no longer working. Technicians uninstalled the instrument, and boxed it up in its shipping case to be sent to Sigma Space for repair. The start time of unavailable data is 4/19 @ 13:10. The most recent DQPR status is "waiting - for spares."

2017/04/07, DQPR-6142: The co and cross-pol channels are nearly equal. This normally should not happen for clouds, and this issue looks to have occurred after coming back on 03/09 from the outage.

LIDAR --- Doppler LIDAR --- Operational.

LIDAR --- Raman LIDAR --- Not Operational.

2017/05/05, DQPR-5906: Adam Theisen asked if this plan to repair the laser heads is still on track. John Goldsmith plans on a June repair due to the limited availability of personnel. The most recent DQPR status is "waiting - for spares."

2017/03/31, DQPR-5906: The laser heads are scheduled to be repaired by the first week of April. John Goldsmith will coordinate with Todd Houchens to have them installed at AMF3 as soon as possible.

2017/02/03, DQPR-5906: The heads in the front bench showed possible signs of damage, so they will be sent to Continuum for inspection. Operators were not successful in bringing the system up using the rear bench (with low laser power). The IM and operators will consult Continuum about this difficulty before deciding how to proceed.

2017/01/20, DQPR-5906: The RL went down due to the power outage on site, and has yet to come back online. This DQPR is just for documenting the longer outage compared to many of the other instruments. IM John Goldsmith added that Todd Houchens will be on site the week of 2017/01/23 to check the laser for damage due to the cooling water freezing. He will work with John to determine if the system can be brought back into service, or if repairs are necessary.

LIDAR --- CEIL --- Operational.

RADAR --- RWP --- Operational as per <http://radar.arm.gov/>.

RADAR --- KAZR --- Operational as per <http://radar.arm.gov/>.

[2017/05/19](#), DQPR-6216: The OLI KAZR has increased spectrum width values, which was determined to be a failing PLO in the RG assembly. The mentor is planning to replace the PLO during the next site visit. The most recent DQPR status is "waiting - for site visit."

RADAR --- KASACR --- Operational as per <http://radar.arm.gov/>.

[2017/04/14](#), DQPR-5979: The latest data from 4/1 shows that this issue is still occurring. Adam Theisen asks what the next steps are. The most recent DQPR status is "in progress - assignments."

2017/03/10, DQPR-5979: The W-band will be operated only sporadically for trouble shooting, and the KaSACR will be down for extended periods as technicians work to help diagnose the issue. The most recent DQPR status is "in progress - assignments."

2017/02/24, DQPR-5979: Work has been done with Todd Houchens and on-site techs to get reinforcement for the flexible waveguide installed on 2017/02/16. The effectiveness of this fix is still being evaluated, and the most recent DQPR status is "open - requires action."

2017/02/06, DQPR-5979: The differential phase from the hemispheric RHI scans is consistently higher at negative distance ranges than at positive ranges. This difference appears to be independent of the spatial structure of the reflectivity, differential reflectivity, and correlation coefficient fields. See the attached plot on the DQPR for an example.

2017/01/27, DQPR-5704: An increased noise floor occurred twice on 2017/01/03. Prior to this occurrence, the last events were on 2016/12/29, when there was an increased noise floor three times.

2017/01/23, DQPR-5947: When switching to ppivh mode, one of the boards that controls transmit switching is getting confused, and the mode defaults to single pol mode. The radar is transmitting on H, but not V. This also causes the drop in rhohv, as it's correlating the H return with what is mostly a noise field (plus the cross polar signal). Unfortunately, these files won't be fixable, and so neither should be used. At the very least, their polarimetric variables should not be used. This is a sporadic problem, and does appear to be infrequent. These files will need to be DQPR'd.

2017/01/09, DQPR-5848: Just to document, this apparent ingest issue is occurring in the latest data up through 2016/12/22.

2016/12/15, DQPR-5848: Starting on 2016/09/27 at 19:30 UTC, there looks to be an issue with how the ingest is setting the transition flag, and getting the sweeps for the HSRHI data. The number of sweeps in the HSRHI files start to shift between 1-3, when the shifting should not start until 4. Some examples of the azimuth and transition flags are posted below.

2016/10/12, DQPR-5704: The data looks saturated at times. It looks like we are still getting some returns, so it does not seem that the transmitter is going out. This is occurring in both RHI (Range Height Indicator) and PPI (Plan Position Indicator) plots at random times. This was brought up during the data review, but it looks to be an ongoing problem. See DQPR for attached plots. IM Joseph Hardin replied that this might just be an issue of terminology, but that he does not see any saturation, nor missing data. Adam Theisen posted previous scan plots for reference. He noted that it is probably a terminology issue, but if you look at the previous RHI scan, there is a large difference in the background reflectivity, as well as a jump in the Zdr (differential reflectivity) values. Joseph replied that we tend to refer to these particular plots as having an increased noise floor. There is something more subtle going on here that we are attempting to track down. It does seem to be very infrequent (once a day or less per mode).

RADAR --- WSACR --- Operational as per <http://radar.arm.gov/>.

[2017/05/25](#), CM-2017-AMF3-VSN-1984: The RDS2 Data2 disk crashed for the W band. The operator removed and replaced the hard drive Crucial 512GB SATA P/N CT512M4SSDS.

2017/04/14, DQPR-5979: The latest data from 4/1 shows that this issue is still occurring. Adam Theisen asks what the next steps are. The most recent DQPR status is "in progress - assignments."

2017/04/14, DQPR-5971: Joseph Hardin has an assignment to write DQR D170414.5. The most recent DQPR status is "in progress - assignments."

2017/04/07, [Radar.arm.gov](http://radar.arm.gov/): The WSACR was pinned last week due to weather.

2017/04/03, DQPR-5971: This issue looks to have been resolved. If Joseph agrees, Adam will assign him a DQR to document this.

2017/03/24, DQPR-5971: Adam Theisen is waiting for data to arrive at the DMF to verify.

2017/03/10, DQPR-5979: The W-band will be operated only sporadically for trouble shooting, and the KaSACR will be down for extended periods as technicians work to help diagnose the issue. The most recent DQPR status is "in progress - assignments."

2017/02/01, DQPR-5971: Horizontal polarization was not being transmitted by the radar. This has been going on for at least 2 weeks, and it is currently being diagnosed. In the meantime, the W-band will be operated only sporadically for troubleshooting, and the KaSACR will be down for extended periods as technicians work to help diagnose the issue. The most recent DQPR status is "open- requires action."

2017/01/11, DQPR-5705: PPI missing data was found on 2016/12/29, and HSRHI missing data was found on 2016/12/11. The most recent DQPR status is "open- requires action."

2016/12/09, DQPR-5705: Adam Theisen added that the latest data from the DMF is from 09/19.

2016/10/12, DQPR-5705: WSACR is sometimes showing some degraded/missing data. In the PPI (Plan Position Indicator) plots, there are missing data between 60-90 degrees. In the RHI (Range Height Indicator) plots, there are missing data throughout the scans. In the RHI, the background Zdr signal drops out, and the values in the echo region are high compared to bracketing scans.

IMG --- TSI --- Operational.

AOS --- General --- Partly Operational, Some Data Dropouts.

2017/03/14, DQPR-5858: The status of Cynthia Salwen's assignment has been updated to 'accepted/open' by the PRB, and the most recent DQPR status is "in progress - assignments."

2017/03/02, DQPR-5858: Joshua King suggested escalating this DQPR due to the nature of this problem.

2017/02/22, DQPR-5858: Cynthia is still trying to troubleshoot the data dropout problem. Her next step is to set up a virtual machine server as a test platform at BNL. There have been delays in getting the ANL-BNL network link back up, and this step is necessary before setting up the VM server. Rob Denney has been working with BNL ITD to get this working again, but so far, neither side has found the solution.

2017/01/06, DQPR-5858: IM Cynthia Salwen has added the following: Brent has not found anything in the logs yet. He spoke with an instrument mentor who developed serial software; this mentor said that moving to a VM caused problems with the serial, and consequently, the mentor had to use a different serial library. Since the software is developed with labview, the options are different. Cynthia will try other tests, and Brent will talk to his team about this.

2016/12/20, DQPR-5858: OLI and SGP both have virtual machines for the AOS computers, and both are showing data dropouts on multiple instruments at the same time. These dropouts can be as short as a couple of seconds, or up to 30 seconds or more. In OLI there are missing data lines at the same time in the files for the WXT520, which is on Unit 1, and the CPC3772, CPC3776, and Dry Neph, which are on Unit 2. There are no dropouts on the Wet Neph. SGP shows dropouts in the data files of the WXT520, which is on Unit 1 and the TAP, CPC3772, and the Dry Neph at the same time. At both sites, the dropouts seems to have started at the beginning of the deployments. There are no other error indications that the data is not being received from the instruments. Brent Kolasinski is looking into the VMWare logs and expects to consult with VMware support.

AOS --- aosmet --- Operational.

AOS --- CPC --- Operational.

AOS --- CAPS-PMEX --- Not Operational. Being Fixed and Calibrated at BNL.

2017/05/08, DQPR-5816: The OLI CAPS is at BNL, where one of the sample pumps was replaced, the 3- DAQ cards were mounted with screws, and optics were cleaned. The system is currently undergoing a performance test, and as part of this check, some irregularities (signal fluctuations) were observed. The mentor is in contact with the manufacturer. Once the signal fluctuations are resolved, a PSL calibration will be performed prior to shipment back to OLI. This PSL calibration is necessary due to a firmware issue. While Aerodyne is testing a new card that corrects the issue, it is not yet ready for prime time. The most recent DQPR status is "open - requires action."

2017/03/20, DQPR-5816: Joshua asked if there is an update on the CAPS. Was it sent to BNL? It looks like the DMF are still collecting raw (00-level) data, but ingests are currently disabled.

2017/01/20, DQPR-5816: This instrument continues to have problems. As a result, IM Arthur is asking that the OLI-CAPS be sent to BNL for servicing, as the problem cannot be diagnosed remotely. Scott Smith will send the shipping container for the instrument to OLI. Joshua King suggested that this DQPR be escalated to PRB attention, given the ongoing issues. Arthur Sedlacek has started the logistics of sending the unit to BNL. The most recent DQPR status is "in progress - assignments."

2017/01/04, DQPR-5816: This DQPR has been linked to DQPR 5895. Joshua King added that he opened 5895 to separately resolve the raw data/collection/ingest issues described for the CAPS and CO beginning 2016/12/28. This DQPR can continue to serve as a resolution point for the potential NO₂ contamination issues affecting the CAPS.

2016/12/15, DQPR-5816: Joshua asked Art what kind of timeline he needs for further investigation. Art responded that we are currently collecting data on particle-free ambient air via a HEPA filter. We are doing so to confirm that the molecular interference is coming from NO₂, to identify the wind directions which bring in the NO₂, and to collect enough data in the current configuration to figure out if one channel could serve as the molecular interference monitoring channel. This monitoring channel is likely to be the blue channel, which will allow us to correct the green channel. Upon ArtC's return to BNL next week, he will look at the data to see if the statistics will allow for this. 2016/12/02, DQPR-5816: Arthur added that only the red channel will be free of NO₂ signal contamination. Therefore, the red channel data are fine.

2016/12/01, DQPR-5816: Since the CAPS takes a measurement of the molecular extinction every 20 minutes, and subtracts this quantity from the total extinction measured during normal operation, the only way to consistently generate a negative extinction is to have a baseline (acquired on particle-free air) that is larger than the total extinction. The only way this could happen is if a time-varying molecular species is present. Further investigation has suggested that locally sourced anthropogenic emissions of NO₂ is the likely origin of these episodic periods. There are 3 pieces of evidence that NO₂ is the culprit: firstly, optical extinction under particle free conditions (which are achieved with a HEPA filter) reveals that these episodes characterized by negative extinction also exhibit a wavelength dependence in light absorption that parallels the known absorption spectrum of NO₂ (see 2nd attached file on DQPR page); secondly, negative signals are tightly correlated with CO, a known tracer from combustion activities; lastly, the local prevailing wind direction is from the north, where there are sources of diesel emissions. Taken together, this is strong evidence for the presence of NO₂ emissions impacting the OLI AOS. Using a calibration for the green, it is estimated that the NO₂ loading is over 1.2 ppb. The CAPS simply measures optical extinction, irrespective of whether the extinction is molecular or particulate in origin. The CAPS takes a particle-free background reading every 20 minutes in an effort to account for variations in molecular extinction caused by changes in the molecular composition of air masses. However, the large absorption cross-section of the NO₂, and shifts in particle loadings thwart the background correction scheme employed by the CAPS instrument. Since we don't have a NO₂ measurement at the OLI site to determine NO₂ to be the culprit, IM Arthur Sedlacek has asked the AOS technicians to install a HEPA filter in the CAPS sampling line to confirm that the behavior described above is due to molecular species, and not particles. Arthur will also contact the manufacturer about the idea of converting the blue channel to a particle-free green channel. In this way, we will have a constant measure of NO₂, thereby enabling the green aerosol channel to be corrected for these episodes. In the long term, we may want to terminate aerosol extinction measurements via the CAPS at Oliktok, or, live with the issue, and simply flag data as bad (unusable) when the wind direction is from the north, where the desalination plant is located. Other long-term options include adding a fourth channel to the CAPS that measures NO₂ full-time, using an NO₂ scrubber on the front end of the CAPS (this is a consumable, and particle loss issues would have to be determined), or procuring a separate way of locally measuring NO₂. This observation does raise the question as to what is precisely present in these plumes. It is possible that other molecular species (e.g., hydrocarbons) could be present locally, and have the potential of impacting other instruments. Several informative graphs have been posted to the DQPR.

AOS --- ACSM-- Not Operational, Shipped to Aerodyne for Repair on 4/25.

2017/05/05, DQPR-6123: The OLI ToF ACSM was received at Aerodyne on Tuesday, May 2. The examination of the pre amp revealed damage to the circuit board. A new board has been ordered. When it is received, it will be installed and proper operation verified. The most recent DQPR status is "waiting - for spares."

2017/04/28, DQPR-6123: Thomas Watson was assigned an open-ended DQR to cover the data outage. The most recent DQPR status is "in progress - assignments."

2017/04/14, DQPR-6123: Thomas Watson updates that troubleshooting with this issue is going slowly. He is in discussions about returning the instrument to Aerodyne for a hands-on look. The most recent DQPR status is "open - requires action."

2017/03/29, DQPR-6123/6093: After the power was restored, the Tof ACSM is not recording data. There is an unknown problem with the instrument, and Aerodyne and Tof Werks have been contacted. This is a new issue. All voltages and pressures are nominal, but there is no signal. The most recent DQPR status is "open - requires action."

AOS --- GHG-Picarro --- Operational.

AOS --- HTDMA --- Partly Operational (Some Data Dropouts Related to Butanol Issue).

2017/05/26, DQPR-6202: Janek added that he is at ENA, and has not been able to look deeply into the issue of the MCPC not getting consistent butanol. He can see that the MCPC is trying to get butanol, but failing. His guess is that the issue is related to inlet pressure, or that the butanol valve is sticking. The most recent DQPR status is "open - requires action."

2017/05/10, DQPR-6202: There were intermittent signal dropouts, which are most likely due to the MCPC not getting butanol reliably. The most recent DQPR status is "open - requires action."

AOS --- UHSAS --- Operational.

AOS --- NEPH --- Operational.

2017/05/21, CM-2017-AMF3-VSN-1982: The light bulb in the Nephelometer Dry went out, so it was removed and replaced.

AOS --- IMPACTOR --- Operational.

AOS --- OZONE --- Operational.

AOS --- TRACEGAS --- Operational.

AOS --- PSAP --- Operational.

AOS --- IMPACTOR --- Operational.

AOS --- TRACEGAS --- Operational.

Other --- AERI --- Operational.

Other --- BBSS --- Operational.

Other --- CIMEL --- Operational.

Precip --- MASC --- Operational.

Precip --- PIP --- Operational, Working on Beginning Data Ingest to DMF Archives.

Precip --- LPM --- Operational, Working on Beginning Data Ingest to DMF Archives.

Precip --- GEONOR --- Operational, Working on Beginning Data Ingest to DMF Archives.

Other --- SR50A --- Operational.

Other --- DataHawk Unmanned Aerial System --- Operational, not a full time instrument.

Other --- TBS --- Operational. Sensor will not be running full time.

Other --- CCN --- Operational.

Barrow

INFORMAL NSA INSTRUMENT STATUS REPORT FOR May 19, 2017 - May 26, 2017
BRIEF STATUS OF INSTRUMENTS IN BARROW (C1) AS OF 2017/05/26:

Facilities	Operational
Data Systems	Operational
Vehicles	Operational

Desktop Computers	Operational
SKYRAD - SKY Radiometer on Stand for Downwelling	Operational
MFRSR - Multifilter Rotating Shadowband Radiometer	Operational
NIMFR - Normal Incidence Multifilter Radiometer	Operational
GNDRAD - Ground Radiometer on Stand for Upwelling	Operational
MFR10m - Multifilter Radiometer at 10m height	Operational
METTOWER - Surface Meteorological Instrument on tower	Partly Operational
AMC - Soil, up/downwelling radiation measurements	Partly Operational
ECOR-twr - Eddy Correlation Flux System	Operational
ECOR-PtBRW - Eddy Correlation Flux System	Not Operational
MWR - Microwave Radiometer	Operational
MWRP - Microwave Radiometer Profiler	Operational
MWRHF - Microwave Radiometer High Frequency	Operational
GVR - G-band Vapor Radiometer	Operational
HSRL - High Spectral Resolution Lidar	Not Operational
MPL - Micropulse Lidar	Operational
CEIL - Vaisala Ceilometer	Operational
DL - Doppler LIDAR	Operational
RWP - Radar Wind Profiler	Operational as per http://radar.arm.gov
KAZR - Ka ARM Zenith Radar	Operational as per http://radar.arm.gov
KaWSACR - Ka-Band Scanning ARM Cloud Radar	Not Operational, undergoing testing as per http://radar.arm.gov
XSAPR - X-Band Scanning ARM Precipitation Radar	Not Operational as per http://radar.arm.gov
AOS - Aerosol Observing System	Operational
CLAP - Continuous Light Absorption Photometer	Operational
CPC - Condensation Particle Counter	Operational
NEPH - Nephelometer	Operational
IMPACTOR - AOS Impactor	Operational
TOWERCAM - 40m tower camera	Operational
TSI - Total Sky Imager	Operational
LPM - Laser Precipitation Monitor	Operational
SR50A - Snow Depth Sensor	Operational
AERI - Atmospheric Emitted Radiance Interferometer	Operational
BBSS (Autosonde) - Balloon Borne Sounding System	Operational
CIMEL - Cimel Sunphotometer	Operational
IOP - CAM	Operational

* Barrow Instruments in Detail: *

INFRASTRUCTURE --- Facilities --- Operational.

INFRASTRUCTURE --- Data Systems --- Operational.

2017/05/22, CM-2017-NSA-VSN-4321: A data disk was removed, replaced, and mailed out.

INFRASTRUCTURE --- Vehicles --- Operational.

INFRASTRUCTURE --- Desktop Computers --- Operational.

2017/05/25, CM-2017-NSA-VSN-4324: The operator's site computer was not logged on this morning, so the operators logged in again and started it up.

SKYRAD --- SKYRAD General --- Operational.

2017/05/17, DQPR-6213: The SKYRAD data were failing tests in the QC VAP that pointed to a tracker issue. This was not readily apparent in the data, but was flagging a fair amount. Adam Theisen thinks that this may be a non-issue, but he wanted the mentor to verify. Please see the DQPR page for the exact flagged dates and times. The most recent DQPR status is "open - requires action."

SKYRAD --- IRT --- Operational.

SKYRAD --- PIR 1 Shaded --- Operational.
 SKYRAD --- PIR 2 Shaded --- Operational.
 SKYRAD --- SOLAR Tracker --- Operational.
 SKYRAD --- B&W diffuse --- Operational.
 SKYRAD --- NIP --- Operational.
 SKYRAD --- PSPg --- Operational.
 SKYRAD --- MFRSR --- Operational.
 SKYRAD --- NIMFR --- Operational.
 TIPTWR --- GNDRAD general --- Operational.
 TIPTWR --- MFR10m --- Operational.
 TIPTWR --- PIRgnd --- Operational.
 TIPTWR --- IRTgnd --- Operational.
 TIPTWR --- PSPgnd --- Operational.
 MET --- METTOWER general --- Operational.
 MET --- CMH --- Operational.
 MET --- Barometer --- Operational.
 MET --- TEMPERATURE / HUMIDITY --- Operational.
 MET --- WIND INSTRUMENTS (SONIC) --- Operational.
 MET --- PWD --- Not Operational.

2017/05/12, DQPR-6203: Jenni submitted an open-ended DQR, D170512.2, so that end users know about this issue. The most recent DQPR status is "waiting - for spares."

2017/05/10, DQPR-6203: The PWD began reporting a hardware error. Diagnostic checking revealed a problem with the DRD rain sensor. The same error had previously been resolved by reseating raincap connections inside unit, as advised by the manufacturer. This time the problem was not resolved with a cable reseat. Site ops noted a very loose connection on the raincap cable, so the instrument will be sent away for repair. There is no spare at the moment, so data will be missing.

MET --- AMC --- Partly Operational.

2017/05/16, DQPR-6178: The period of missing data appears to be increasing slightly as the length of the solar day increases. Ken Reichl has never seen this behavior from the PAR sensors at NSA. He posted a time series of the entire record of PAR sensor data since deployment in August 2012 on the DQPR. Compared with previous years, the sensors, both upward facing (incident) and downward facing (reflected) are not functioning normally. One possibility is that during the fall of 2016 - January 2017, foxes were eating cables, causing the logger to short. Something could have damaged the PAR sensors at this time. Or, there could be dirt or ice accumulated on both sensors. The most recent DQPR status is "open - requires action."

2017/05/13, DQPR-6207: The raw data for the period of 2012/08/08 at 02:00 UTC to 2015/08/22 at 23:59 UTC will be submitted by the mentor for re-ingest and re-processing to follow DOD v3.2. NSA data after 20150822 does follow the current DOD. The mentor will submit this period of reformatted raw data for a1 level and b1 ingest so that the entire data record is based on the same DOD. Ken Reichl has an assignment to write DQR D170519.2 The most recent DQPR status is "in progress - assignments."

2017/05/01, DQPR-6178: At around 0z, there is a ~5 hour period of missing average incident PAR data. This is a recurring issue, and it is consistent with the timing. See the DQPR for a snapshot of the week plot of PAR data. Adam Theisen asked if the instrument might be over-ranging around solar noon. The most recent DQPR status is "open - requires action."

2016/11/03, DQPR-5694: This DQPR has been linked to DQPR 5756, and DQR D161011.3 has been submitted and reviewed by PRB. The most recent status of this DQPR is "in progress - assignments."

2016/10/11, DQPR-5694: Joshua responds to IM Ken Reichl that after conferring with others at the Data Quality Office, the best action is to create another DQR about this behavior, like the one that exists for OLI. Joshua has assigned an open-ended, "transparent" DQR to Ken. He then asks what the relevant time period was for this issue within the NSA C1 AMC data record. The status of this DQPR is "in progress-assignments."

2016/10/10, DQPR-5694: Joshua King adds that vmc from sensor 4 was missing from 14:30 UTC 2016/07/12- 15:30 UTC 2016/09/25. Since returning 2016/09/25, vmc has been decreasing to below 0.3. He is asking mentors if they have thoughts on what is causing this behavior. An attached image can be found on the DQPR page. IM Ken Reichl responds that this is an issue outlined in DQPR-4793 for the analogous site, OLI. The instrument reports soil data as

9999999, or a non-numerical character (for data SGP) for soil systems. The AMC systems may report missing data during warm seasons for instruments that are not sufficiently calibrated. The OLI datastream has an open-ended DQR D151023.3. Ken asks if he should make one for the NSA data as well, and is the DQR system the best way to characterize this issue?

2016/10/09, DQPR-5694: Vwc (volumetric water content) 4 is missing for the entire period starting 16/07/12 to 16/09/25.

ECOR --- ECOR-twr --- Operational.

ECOR --- ECOR-Pt. Barrow --- Not Operational, End of Season.

MW RADIOMETERS --- MWR --- Operational.

2017/05/25, CM-2017-NSA-VSN-4323: Telayna saw a 'collection idle' warning this morning for the MWR, so she logged onto the MWR computer, saw the error message, and restarted the software.

MW RADIOMETERS --- MWRP --- Operational, but Questionable and Unreliable Data.

2017/04/13, Biweekly Telecon: Maria is monitoring issues and determining if the MWRP needs to go back to the factory.

2017/04/07, DQPR-6119: Maria submitted an open-ended DQR (D170403.2) which is pending PRB review. The most recent DQPR status is "waiting - for spares."

2017/03/27, DQPR-6119: The MWRP data are questionable and unreliable. It is possible that there is a strong uncorrected temperature dependence of the calibration. Maria plans that operators will collect one more month of data to have enough calibration points to try to develop a correction. However, because of the likely non-linear temperature dependence, it is possible that a recalibration will not be necessary. The most recent DQPR status is "open - requires action."

MW RADIOMETERS --- MWRHF --- Operational (External Noise Interference).

2016/09/30, DQPR-4165: The 150 GHz channel was showing high noise levels probably because of an external source of interference. Adam inquires if there is a path forward to solve the interference issues? The current DQPR status is "in progress- assignments", and it is open-ended. DQRs D140610.1 and D160426.3 have been reviewed and accepted by the PRB.

MW RADIOMETERS --- GVR --- Operational.

2017/05/25, CM-2017-NSA-VSN-4325: There was a GVR program error, so Jimmy closed the program and restarted the software. The system is now operational.

LIDAR --- HSRL --- Not Operational (Laser Off, Only Reduced Data Mode Running).

2017/05/22, DQPR-6201: While we await the laser repair, the system will operate in a reduced data mode (housekeeping only), with the laser off since May 10th due to a seed laser failure. The rep rate of data is much less as a result, and any processed form would be empty or invalid. The most recent DQPR status is "waiting - for spares."

2017/05/09, DQPR-6201: The seed laser in the HSRL no longer functions properly. The system has been shut down until the laser system can be repaired. The most recent DQPR status is "waiting - for spares."

LIDAR --- MPL --- Operational.

LIDAR --- CEIL --- Operational.

2017/05/22, CM-2017-NSA-VSN-4322: The dew blower showed a red flag warning, so Walter removed the dew blower (CLB311-115 S/N K1510002), and installed a spare (CLB311-115 S/N N0930006).

2017/05/09, DQPR-6153: The blower was replaced on 4/25 at 19:35 (CM-2017-NSA-VSN-4307), but the new blower failed on 4/26 at 00:35. Another blower was purchased by ANL. The most recent DQPR status is "waiting - for spares."

2017/05/05, DQPR-6153: The refurbished dew blower unit was installed, and within 24 hours, the red flags returned. Walter reported this to the mentor, and is waiting for the replacement that is on order. The most recent DQPR status is "open - requires action."

2017/04/20, DQPR-6153: Adam Theisen added that this might be due to blower failure.

2017/04/16, DQPR-6153: From 03/19/2017, at least one alarm has been consistently active.

LIDAR --- Doppler LIDAR --- Operational.

RADAR --- RWP --- Operational

2017/05/24, DQPR-6206: Paytsar has looked into the intermittent missing data issue, and has not found what is causing intermittent periods of missing data. The log messages show that the software "automatically resumes" operation, but does not show why it quit in the first place, and there are no error messages. It's as if the computer

shuts down and restarts about 20 minutes later. Walter added that the last time he had to restart the computer (via hard boot) was 2017/05/01 when the program and computer hung. There are no log files that he can reference to find when and why the computer shuts down. The most recent DQPR status is "in progress - assignments."

2017/05/19, DQPR-6206: Paytsar Muradyan has an assignment to write DQR D170519.3. Adam pointed out that there are intermittent and short periods of data N/A in the recent metrics, and asks if that is cause for concern. The most recent DQPR status is "in progress - assignments."

2017/05/12, DQPR-6206: Data was unavailable for more than 24 hours (since 4/30/17 at 13:00 UTC). For this time period, the RWP software showed a "queue full" error message, and the normal operation resumed without external input. Paytsar cannot find anything in the logs suggesting there was something holding up the LapXM service. Paytsar asks that site ops keep an eye on the computer to see if the message reappears--if it does, the software should be restarted. The most recent DQPR status is "open - requires action."

RADAR --- KAZR --- Operational.

2017/03/23, [Radar.arm.gov](http://radar.arm.gov): The RDS1 power supply was replaced and the signal processor is operational. The system will be taken out for maintenance for a short time to replace a fan.

RADAR --- KaWSACR --- Not Operational, undergoing testing per <http://radar.arm.gov>.

2016/03/12, DQPR-4041: After much coordination with the pedestal manufacturer and while working with the instrument mentors, the azimuth DSA was re-programmed. Once a reprogrammed Azimuth DSA was installed and verified the Elevation DSA was also found to be faulty. It was replaced with another unit and the system now accepts azimuth and elevation commands. The most recent DQPR status is "waiting- for spares."

RADAR --- XSAPR --- Not Operational as per <http://radar.arm.gov>.

2017/02/16, BiWeekly Telecon: Andrei is looking at parts replacement/repairs/upgrade for June.

2016/08/04, DQPR-4841: The elevation servo amplifier failed, the radar can not scan in elevation. The radar will be upgraded by the end of this year, and will be turned off until then. A DQR was submitted and reviewed by PRB. The DQPR status is "in progress" due to it being open-ended. Adam Theisen's DQR D160719.1 has been reviewed and accepted by the PRB.

AOS --- General --- Operational.

2017/05/26, DQPR-6224: The latest nsaaosX1.00 data is from 05/22/2017. Joshua King will track if any ingest adjustments need to be made. The most recent DQPR status is "open - requires action."

AOS --- AETH --- Operational.

AOS --- CLAP --- Operational.

AOS --- CPC --- Operational.

AOS --- NEPH --- Operational.

AOS --- IMPACTOR --- Operational.

IMG --- TOWERCAM --- Operational.

IMG --- TSI --- Operational.

Precip --- LPM --- Operational, Logger Program Being Worked On.

Other --- SR50A --- Operational.

Other --- AERI --- Operational.

2017/05/19, DQPR-6173: Adam added that there are some short intermittent periods of data N/A, but overall, the data looks better. The most recent DQPR status is "open - requires action."

2017/05/12, DQPR-6173: The ingest software that starts FTSW was failing because of a corrupt soft linked directory. In the ingest terminal, there was an os.symlink (lfrom,lto) error. In the past, Denny Hackel had seen this error maybe once every other year on all the AERIs combined, but he had recently seen it on the AERIs with the VMs at OLI and NSA a couple times this year. The most recent DQPR status is "open - requires action."

2017/04/27, DQPR-6173: Data was unavailable for more than 24 hours from 2017/04/17 at 13:07 UTC to 2017/04/18 at 19:48 UTC. Adam Theisen asked if the program has been stopping more than normal this month.

Other --- BBSS --- Operational.

Other --- CIMEL --- Operational.

IOP --- CAM --- Operational.

5 North Slope Facilities

AMF3

Current and Upcoming Site Visits

Fred Helsel-SNL	June 6-14	Site overview
Todd Houchens, Bruce Edwardson/SNL	June 6-14	Raman Lidar, site cleanup
Cliff Holt/Continuum	June 6-14	Raman Lidar
Ken Reichl, Sebastian Biraud/LBNL	June 12-15	Upgrade/PM AOSGHG

Current and Upcoming IOPs

Black Carbon on the North Slope (Baylor)
Ice Nucleating Particle Sources (NOAA)

Comparison MASC (upcoming)

Site News/Issues

Snow has begun melt off, all snow banks have been cleared.

Unmet Needs

We are running on leased diesel generators while other options are investigated and evaluated.

Site Upgrades

Air conditioner installed in AOS.
Co2 detector installed in Sprung Structure.

Site Safety

Site Staffing Issues

Tethered Balloon Operations

Thirty-one hours of TBS flights were conducted at Oliktok Point from 5/15/17 – 5/24/17. Summary reports of each flight are included below. Optical fiber was also deployed along the surface.

Date: 05/15/17

Instruments flown:

Flight 1, 21:40 – 00:30:

End of tether - DTS fiber

0.5m to V8 tethersonde and SLWC

0.5m to iMet & SLWC & LWC (had to space next to tethersonde because tethersonde was not initially reporting altitude) – bundle 1

30m to iMet & SLWC – bundle 2

30m to V6 tethersonde & Sandia PixHawk autopilot

430m to iMet and POPS dry – bundle 3

0.5m to POPS wet

0.5m to CPC

Flight pattern followed: Spaced SLWCs closely together with LWC, with POPSs and CPC added below cloud base. Profiled SLWCs twice through cloud with DTS plugged in for ten-minute interval between profiles that overlapped afternoon radiosonde launch. The DataHawks were not ready to fly by the time we descended for the day.

General Conditions: Cloud with ceilometer base identified from 330 - 420m during flight. Cloud top ~ 750m. Intermittent snow. Surface winds from NE at < 3 m/s. Surface temperature 0°C. Winds of 5 m/s at 700m.

Notable Events:

- Similar to April, we encountered very strong EMI at 400m AGL. This EMI knocked out iMet and tethersonde transmissions whenever they passed through this area. RF link to the highest iMet (bundle 1) could not be recovered. Bundle 2 lost link intermittently, but could be recovered after passing out of 400 – 410m. The iMet in bundle 3 was recovered, but the XDATA transmission from the attached POPS was not. The V6 tethersonde link was lost and could not be recovered. Since 400m is a recurring hotspot for EMI, we should consider developing a strategy for how to traverse the 395 – 415m area as quickly as possible to avoid comm loss. We should get interesting data from the PixHawk autopilot that was in this altitude range frequently.
- The afternoon AMF3 radiosonde launches at 23:30. We reached 680m AGL and then plugged in the DTS at 23:32. Immediately after observing the first DTS trace we could see that the fiber was broken at 400m, almost exactly where the POPSs and CPC were on the tether – which was puzzling. Shortly after the observers advised us that the radiosonde was not gaining altitude and had ended its sounding. We began to descend the TBS and discovered that the radiosonde had become entangled in our tether at the POPSs and CPC and broken the DTS fiber. After untangling, we descended for the day.

We can fix the DTS fiber, but the data from today will be invalid after 400m AGL. Upon descending, we also realized the radiosonde knocked the inlet off one of the POPS – and we could not find it on the ground. We should be able to make another inlet with spare parts. The observers have advised they will coordinate with us going forward to launch the radiosondes downwind of the TBS.



Figure 1: Radiosonde balloon entangled in TBS



Figure 2: Radiosonde entangled on TBS CPC with POPS missing inlet above

Failures: We intended to operate both LWCs but could not get two iMets with an SLWC and an LWC attached to them to continually transmit. It works for about five minutes, but then the XDATA from the SLWC and LWC is lost. It sounds like when the radio signals eventually sync the XDATA drops out from one of the iMet feeds. We had to turn off one LWC and could keep one iMet, SLWC, LWC bundle operating with one iMet, SLWC bundle (no second LWC). We spread them as far as possible frequency-wise, but could not avoid the issue. We will try some alternatives tomorrow.

The aerostat we are using was already sent back to be cut down because it was much larger than ordered. Upon inflation, we found it did not have much cut off, which will make flying the aerostat in winds over 5 m/s at the surface difficult.

Date: 05/16/17

Instruments flown:

Flight 1, 19:23 – 01:24:

End of tether - DTS fiber

0.5m to iMet & SLWC & LWC – bundle 1

30m to V8 tethersondes & SLWC

30m to iMet & SLWC – bundle 2

5m to V6 tethersonde

30m to pops wet SN14

0.3m to iMet

0.5m to pops dry SN18

0.5m to cpc

Flight pattern followed: Spaced SLWCs closely together (~30m apart) with LWC, with POPSs and CPC added below cloud base. Profiled SLWCs five times through cloud with DTS plugged in for two thirty-minute intervals between profiles spaced two hours apart – the latter overlapping the afternoon radiosonde launch.

General Conditions: Cloud with ceilometer base identified from 140 - 180m during flight. Cloud top ~ 350 - 400m. Surface winds from E at < 4 m/s. Surface temperature -1 to 4°C. A higher cloud layer around 2.5 km dissipated shortly after launch.

Notable Events:

- Strong EMI was experienced again at 400m, with a secondary hit around 160m (which was also seen in April). In order to get all of the SLWCs out of the cloud top they spent a lot of time in the 400m area, and there were several drops in the data files as a result.
- On final descent, noted light icing of fiber and tether around POPS/CPC bundle but POPS inlets seemed unobscured. Heavier icing began ~5m above POPS SN14 (highest POPS) so we were able to keep them mostly out of the cloud, although they did experience some in-cloud flight.

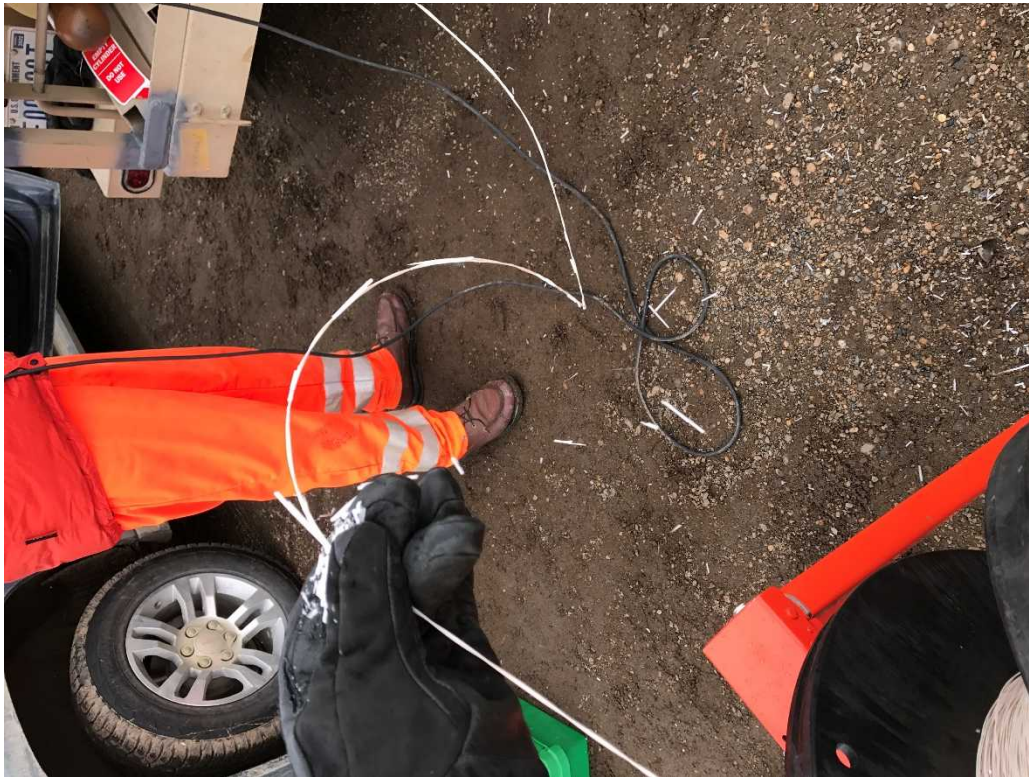


Figure 3: Light icing on DTS fiber around POPS and CPC



Figure 4: Heavier icing around DTS fiber starting ~5m above SN14 POPS

Failures: After coordinating with Skysonde developers, we attempted to run the LWC/SLWC daisy-chain iMet on a standalone computer. We still experienced the issue of losing the XDATA streams from both instruments shortly into the flight, so not much data was obtained from bundle 1. After discussions with Anasphere, the LWC manufacturer, there may be some lengthening of the LWC data packet that is happening with time. We have a call with the Skysonde developers tomorrow to try some testing to attempt to resolve the issue.

Fan noted the time on the CPC appeared off yesterday. We changed the time on the CPC immediately before flight. Upon downloading the data, the time had reverted to what it looked like yesterday. Fan is asking TSI if there is some CMOS battery we need to look at changing or what we are missing.

The iMet data file in the POPS bundle has timestamps that are GMT + 6 hours. It's unclear how this happened, but this is the first time we tried to collect data on a Windows 10 machine. We will watch for the issue in the future.

Date: 05/18/17

Instruments flown:

Flight 1, 17:59 – 19:25
End of tether - DTS fiber
0.5m to iMet & SLWC9
70m to V8 tethersonde & SLWC
70m to iMet & SLWC4
5m to V6 tethersonde
20m to pops wet SN14
0.3m to iMet
0.5m to pops dry SN18
0.5m to cpc
05m to Sandia PixHawk autopilot

Flight 2, 20:33 – 22:11
Same as Flight 1 without Sandia PixHawk autopilot

Flight 3, 22:37 – 23:31
Same as Flight 1 without Sandia PixHawk autopilot and POPS wet SN14

Flight 4, 23:38 – 00:42
Same as Flight 1 without Sandia PixHawk autopilot and POPS wet SN14

Flight pattern followed: Spaced SLWCs approximately evenly through cloud layer with POPSs and CPC added below cloud base. Profiled SLWCs four times through cloud with DTS plugged in for ten minutes during Flight 2 and thirty minutes during Flight 4. Held at 420m AGL during Flight 1 for DataHawk to fly circles at same altitude as POPS iMet.

General Conditions: Cloud with ceilometer base identified from 200 - 230m during flight. Cloud top 350 - 400m. Surface winds from W at < 4 m/s. Surface temperature -4 to 2°C. A higher cloud layer around 3 km appeared from Flight 3 onward.

Notable Events:

- EMI was experienced at low altitudes. The highest iMet and SLWC were typically not reporting until above 200m AGL.
- Since the aerostats were still oversized, after being returned to the manufacturer to be cut down, we topped off the aerostats with air to maintain a full shape for handling purposes. We didn't want to completely fill with helium due to the excess lift. There was some confusion about how much helium had initially been used to fill the aerostats prior to patching the leaks yesterday, and there was likely less used than initially thought. While aloft during Flight 2 when the balloon was floating above cloud top we began to notice it handling oddly. Lift seemed less than expected and there was a steep angle on the tether. We retrieved the aerostat, vented for a short time, and filled with 1.5 bottles of helium.

During Flight 3 it was observed that the handling issues began immediately below cloud top (~ 10m). The angle on the tether would divert from zenith almost instantly upon reaching this area. We realized that due to the very strong inversion today, the air in the balloon was making it stable and causing it to sink in the comparatively warmer air at and above cloud top. Once we diagnosed the issue, we ascended to right below cloud top during Flight 4 where the balloon maintained normal lift. The balloon was left in the hangar vertically overnight to allow more air to be vented from the base of the balloon tomorrow and additional helium added.



Figure 5: Tether into clouds on Flight 1

Failures: Air in balloon prevented flight above cloud top so POPS could not be ascended to above cloud top.

No AMF3 radiosondes were launched today due to an overnight Windows update breaking the Vaisala software.

Date: 05/19/17

This afternoon we deployed ~3,000' of DTS fiber along the surface like the attached image. We added colored flags every 60'. We also marked corners 1 – 4 with a large piece of reflective fabric, which should be able to be seen from the GoPro on the TBS.

Lat/lons:

1: 70.4950, -149.8872

2: 70.4932, -149.8958

3: 70.4931, -149.8951

4: 70.4941, -149.8883

5: 70.4946, -149.8887



Date: 05/20/17

Instruments flown:

Flight 1, Part 1: 23:28 – 01:21

End of tether - DTS fiber

0.5m to iMet & POPS

70m to V8 tethersonde & SLWC4

0.5m to CPC

70m to iMet & SLWC4

0.5m to V6 tethersonde

180m to pops dry SN18

0.3 to iMet (referred to as DataHawk iMet)

Top iMet at 715m
DTS in 00:38 - 01:08
DataHawk circling DH iMet briefly before descent for issue

Part 2, 01:21 – 01:50
Continued ascent at 01:21 until top iMet at 850m, DH iMet at 550m
DataHawk circling DH iMet

Part 3, 01:50 – 02:56
DH followed TBS up while we moved top iMet to 1000m at 01:50, DH iMet at 690m
Held altitude 01:57 - 02:12 while DH circled DH iMet

Flight 2, 03:14 – 03:49
Moved to west end of runway and relaunched for radar calibration flight.
iMet and POPS at end of tether but POPS did not report due to inlet misalignment.
Radar sphere 35m below POPS.

Held sphere at 554m 03:37 – 03:49
Descent required due to R-2204 activation ending time.

Flight pattern followed: Initially prepared for cloud flights but flight was delayed due to logistical preparation to collect from the surface fiber run and TBS fiber run simultaneously. DH overflow surface fiber with some interaction with TBS crew from ~18:30 – 19:30. Warmer segments in the surface DTS fiber run appeared in the data, and we speculated these were from ice-free dark brown surface patches. We located the largest surface patch on the fiber run and placed heat packs around an ~ 1m length of fiber to try to correlate the location. The heat pack spike showed up in the data where we had identified the largest ice-free surface patch – that we had identified as a warm spike in the data previously.

Once ready to fly clouds had dissipated and we conducted aerosol profiling flights in coordination with DataHawk circling at the altitude of our lowest iMet. We then conducted a radar calibration flight before having to descend in order to make the R-2204 closure time.

General Conditions: Initial clouds with ceilometer base identified ~680m. Cloud top 1 km. Clouds dissipated by 02. Surface winds from W at < 2 m/s initially. Around 02:15 temperature decreased by 4 °C, it had been about 3 °C. This was accompanied by winds shifting to NE and increasing to 4 m/s. A stratocumulus layer with bases around 600m moved in simultaneously.

Notable Events:

- Surface DTS fiber run left collecting overnight.
- TBS flew almost directly over KAZR. Strong return on KAZR was visible from both TBS POPS.
- Observed higher counts from higher altitude POPS (~50 in lowest bin compared to < 10 in lowest bin from lower altitude POPS).

Failures: Radar calibration flight not very successful due to handheld radios not allowing much communication between TBS and radar staff unless radar staff came out of radar shelter.

CPC and iMet below CPC lost power early into flight. Unclear yet why.

POPS was placed on tether during radar calibration flight but inlet was out of alignment and no data were collected.

Intended to fly GoPro over surface fiber run but battery would not charge. Was able to charge at end of day, but no images collected today.

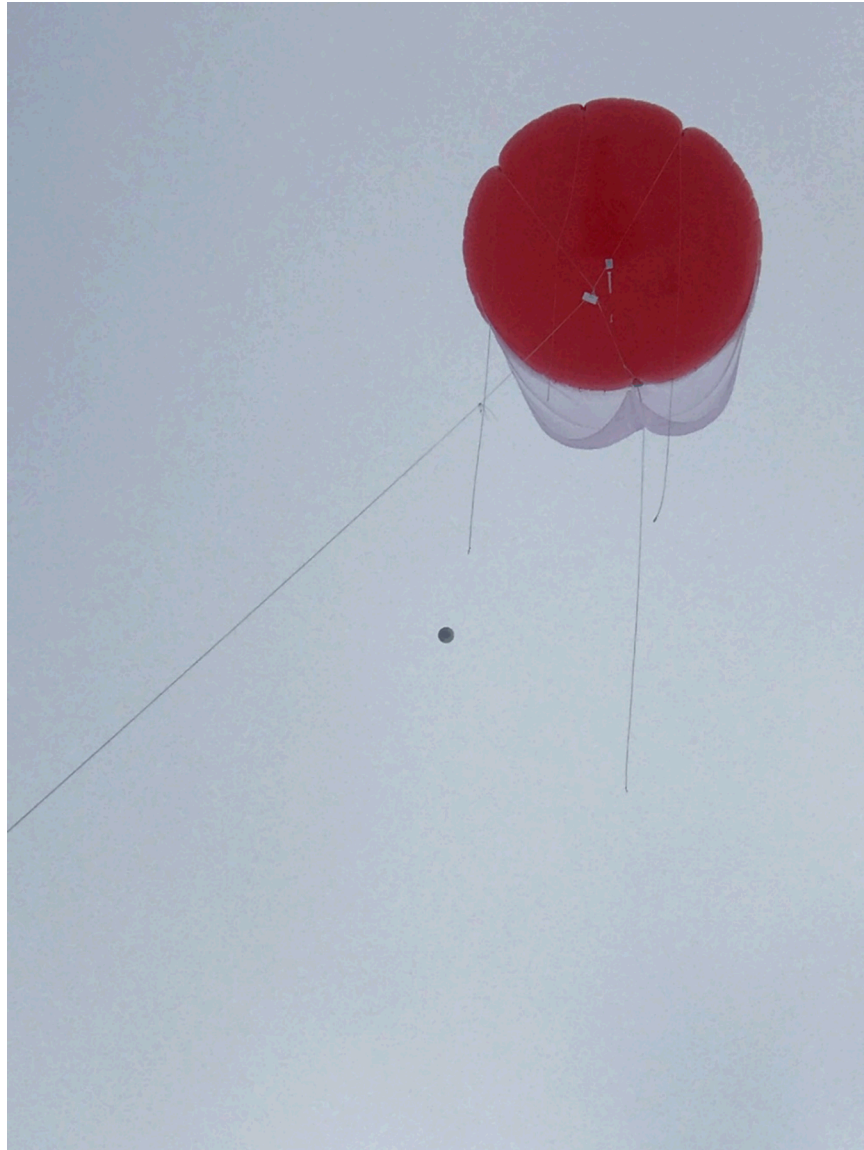


Figure 6: Radar calibration sphere in flight below balloon and POPS



Figure 7: TBS at 1km with DH circling iMet at 690m

Date: 05/21/17

Instruments flown:

Flight 1, 23:43 – 01:27

End of tether - POPS SN18

0.5m to iMet

0.5m to V8 tethersonde & SLWC

33m to radar sphere

Flight pattern followed: Ascended POPS to 433m and held altitude for radar calibration.

General Conditions: Stratocumulus base identified ~250m. Surface winds from NE at 6 – 8 m/s, winds aloft varying from 4.5 – 7 m/s. Temperature -2.5 °C.

Notable Events:

- Surface DTS fiber run left collecting again overnight. Integration time slowed to 5 minutes to improve accuracy.
- Significant icing on tether developed in short time.
- Observed much lower counts from POPS than seen on previous day's flight at higher altitude.

- Joe Hardin was optimistic about calibration flight. Several hits from sphere were observed and he plans to process the data. If warranted, other calibration flights may occur.



Figure 8: Helikite in flight at 430m with POPS and radar sphere.

Date: 05/23/17

Instruments flown:

DTS fiber
0.5m SLWC4
0.5m POPS SN14
0.5m POPS iMet
0.5m CPC
30m V8 tethersonde & SLWC
30m LWC 1
210m to POPS SN18

Flight pattern followed:

Flight 1: 17:41 – 19:34

Ascended to 730m (670m CT + 60m), reached at 18:21. When DTS fiber plugged in discovered fiber bad. Descended to 380m starting 18:46 (440m CB - 60m), reached at 18:59. Held at 380m while fiber spliced.

Flight 2: 19:34 – 21:20

Ascended at 19:34, reached 1150m at 20:04. DTS in 20:10 - 20:30, inversion visible around 650m AGL (CT). Noticeably high particle counts (> 60 in lowest pops bin) on POPS SN14. Ascended to 1200m at 20:37. Ascended to 1250m at 20:42. Began descent at 20:43. Observed icing on tether when balloon

at 1126m (on tether 130m above surface). POPS SN18 surfaced 21:20, held at 280m AGL. During this flight, CT decreased from 600 to 400m and fog moved in at surface.

Flight 3: 21:27 – 22:33

Ascended at 21:27 to 585m (CT 400m + 185m). Did not observe inversion on radiosonde data during ascent. DTS in 21:45 - 22:05. Small inversion on DTS noted around 400m (CT). Started descent 22:11. Ice on tether at 500m AGL (on tether 85m above surface). Surfaced at 22:33.

General Conditions: Cloud base at 400m, cloud top decreasing from 680m to 400m with time. Ground fog moved in during flight 2. Surface winds from NNW at 3.5 m/s initially, increasing to 5 m/s by end of flight 3. Temperature -2 °C at surface.

Notable Events:

- Joe Hardin did not believe conditions warranted trying a calibration flight today.
- New altitude record for aerostat (1.25 km).

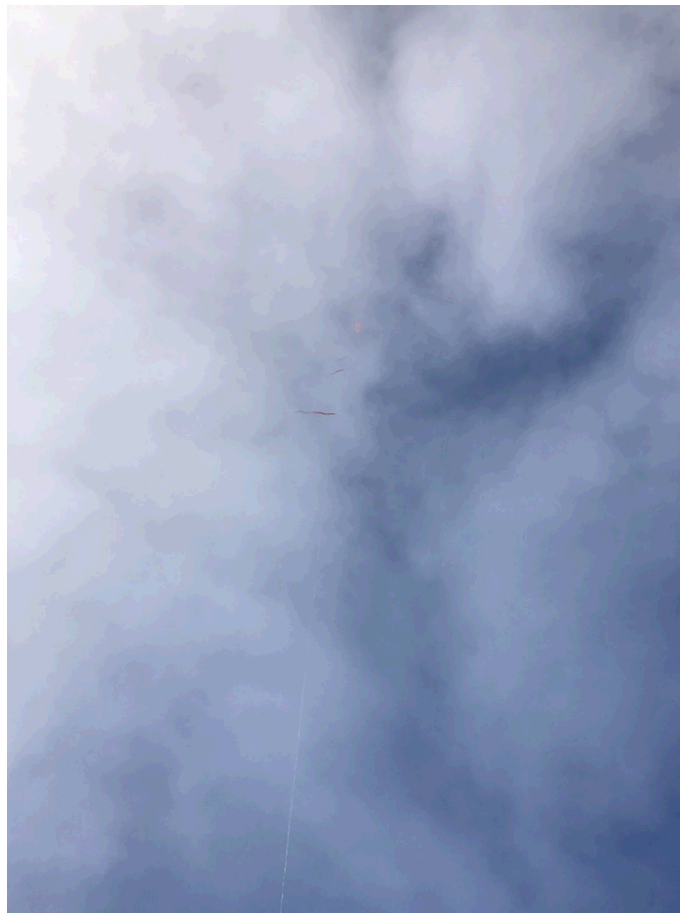


Figure 9: Aerostat barely visible through clouds while on descent during Flight 2

Date: 05/24/17

Instruments flown:

DTS fiber
0.5m POPS SN18
0.5m POPS iMet
60m CPC
0.5m V8 tethersonde & SLWC
60m SLWC4
40m LWC 1

Flight pattern followed:

Flight 1: 11:40 – 15:10

Ascended to 835m, reached at 12:30. Intended to ascend higher but heavy wet snow was wetting tether and icing balloon surface, which added weight. DTS in 12:40 – 13:25. Began descent at 13:30. Held at 350m while DataHawk circled 190m AGL iMet. DTS in 13:50 – 14:05. Surface at 15:10.

General Conditions: Cloud base at 1.2 km, cloud top above 3 km. Snowfall with large wet aggregate clumps until about 13:45. Surface winds calm, from southeast at 3.5 m/s aloft. Temperature 0 °C at surface, -2 °C aloft.

Failures: SN14 had issues when retrieving data after flight on 5/23, but we were able to eventually get it working. Upon booting today, it was not outputting any particle count > 0.

Barrow

Current and Upcoming Site Visits

Dan Lucero/SNL	June 12-23	IOP support
Chuntao Lui, Thomas Lavigne/TX A&M	June 12-23	Electric Field Study IOP
Todd Houchens/SNL	June 13-14	Radar support

Current and Upcoming IOPs

SNPP/NPOESS Ground Truth Sonde Launch, Phase 5 – Started Oct 1, 2016
Seismic Probes for NSF– POP Ends, Oct 31, 2018
Carbon Aerosol/Methane Gas, - Task order under CPA 1260749 for labor – POP Ends – 2018
Multi-faceted Approach to Characterizing Potential Radiative Forcing on the NSA using Two Coastal Sites, Baylor – June 2016 – Sept 2017.

Site Issues

The Auto Balloon Launcher is having issues with computer power supply; the computer shipped out for repair. Currently performing manual balloon launches.

Unmet Needs

NA

Site Upgrades

NA

Site Safety

Contractor Site Safety Plan is in the process of being updated to include confined space training, which was identified in the last safety inspection August 2016.

Site Staffing Issues

NA

Distribution

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